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Chapter 1

Introductory Chapter: Low Carbon Economy. An Overview

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1. Introduction

In the broad spectrum of the feasible decarbonization pathways, the challenge for political and economic decision-makers is to weigh uncertain impact from different technologies. This is not an easy task, and most countries are trying to undertake common global policies such as the Paris Agreement in 2015. Beyond global actions, specific local actions adapted to different national scenarios are of utmost importance.

Climate change is one of greatest environmental, social, and economic threats of our time. According to the Intergovernmental Panel on Climate Change (IPCC), greenhouse gas emissions (GGE) have increased since the preindustrial era and are now the highest in history [1]. The concentration of carbon dioxide in the atmosphere is now 1.5 times higher than the preindustrial era. As a result, earth's average surface temperature has increased by around 0.6°C from the beginning of the twentieth century and is expected to reach 1°C by 2035 [2]. Current projections point that if no additional mitigation efforts are implemented, the estimated warming in 2100 will be in the range between 2.5 and 7.8°C (when compared with the preindustrial levels). According to the scientific community, consequences of temperatures at or above 4°C include significant species extinction, extreme weather events, enormous risks to global and regional food security, consequential constraints on common human activities, and increased likelihood of triggering tipping points and limited potential for adaptation in some cases.

2. Leading technologies

Beyond these critical and most likely events, the climate changes pose a set of adverse conditions and risks to businesses coming from supply chain disruptions due to unexpected

weather phenomena and because consumers demand a serious commitment from brands in the preservation and sustainability of the environment. Simultaneously, this low carbon transition era could be a silver bullet for companies leading the new trends that will pave the future energy paths and solutions.

A first measure to guide the companies in this transition was to put a price in an externality, such as carbon. This would help to level the costs for new low carbon solutions and favor the capital injection in innovation and scale-up activities. Irrespective to the total success of this measure, the truth is that a price for carbon was and still is an important policy action despite the deregulated field of low carbon technologies. Additional incentive measures should go through a more effective coordination between countries and intra-countries, the agreement of renewable electricity standards, and other financial actions as tax credits and cash grant.

There is a set of relevant low carbon technologies, but it seems the front-runners are the LEDs, solar PV, onshore wind, and hybrid and electric vehicles [3]. Bioenergy seems to be going through a transitional phase with strong oscillations derived from changing political policies [4]. In fact, the pace of these technologies depends on how they shape their performance and cost but also on the regulatory measures from national and international governments and organizations.

While the LED technology seems to target a maturation state with the abrupt fall of the incandescent light bulbs, the solar PV and onshore wind technologies still fight to achieve a total consolidation in the market. An ambiguous behavior is expected regarding these technologies; while the emerging countries looking for deployment in the renewable energy field usually find in the solar PV and onshore wind the most adequate solutions, the major governments start to cut subsidies threatening large advances in the installed capacity. With the recent ripple effect of the VW scandal and consequent stricter rules regarding emissions, the emergence of hybrid and electric vehicles seems to be an undeniable reality. Despite the many hurdles that characterize the success of this kind of vehicles, several policy measures are expected to ease the deployment of this technology with tax exemptions, subsidies, accessible parking, and significant, logistical, and infrastructure improvements. The bioenergy sector seems to lose its strength in the recent times due to changing policies, the absence of a regulated market for biomass pricing, and the lack of standardized pretreatment procedures that are able to provide a consistent product [5]. Furthermore, some of the technologies related to biomass conversion are still characterized by obsolete procedures regarding energy efficiency [6].

3. Policy and conclusions

It is not expected in the next few years that major technological breakthroughs and energy efficiency measures can assume a key role to ensure net economic benefits with improved environmental sustainability procedures and reduced costs for the stakeholders. However, the key players seem a bit wary to accept this challenge mainly because this requires up-front investments that will be only recovered with time and because many of the actions to accomplish significant saves are intimately related with long-term behavioral changes by the consumers. Once again, the adopted policies by the governments will decide the success of

implementing effective energy efficiency actions by defining the consumer acceptance and the chances to get successful business models in large scales.

The last years can be seen as the watershed era for the low carbon economy. This implies that the main stakeholders should give some thoughts on the way to pave our future by balancing the economic prosperity without endangering the future generations.

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References

[1] IPCC. In: Team CW, Pachauri RK, Meyer LA, editors. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland: Intergovernmental Panel on Climate Change; 2014

[2] Joselin Herbert GM, Unni Krishnan A. Quantifying environmental performance of biomass energy. Renewable and Sustainable Energy Reviews. 2016;**59**:292-308

[3] Kooroshy J, Ibbotson A, Lee B, Bingham D, Simons W. The Low Carbon Economy GS SUSTAIN Equity Investor's Guide to a Low Carbon World. New York: Goldman Sachs; 2015-25. 2015

[4] Ramos A, Monteiro E, Silva VB, Rouboa A. Co-gasification and recent developments on waste-to-energy conversion: A review. Renewable and Sustainable Energy Reviews. 2018;**81**:380-398

[5] Couto N, Silva VB, Rouboa A. Assessment on steam gasification of municipal solid waste against biomass substrates. Energy Conversion and Management. 2016;**124**:92-103

[6] Silva V, Couto N, Eusébio D, Rouboa A, Brito P, Cardoso J, et al. Multi-stage optimization in a pilot scale gasification plant. International Journal of Hydrogen Energy. 2017;**42**:23878

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